

CLAIMS

1. A substrate cleaning apparatus for cleaning a substrate, comprising:

a spin chuck that rotates a substrate;

a brush that comes into contact with the substrate to clean the same; and

a two-fluid nozzle that sprays liquid droplets onto the substrate; wherein

the brush and the two-fluid nozzle are configured to move radially outward relative to a center of the substrate, while the two-fluid nozzle is kept nearer to the center of the substrate than the brush.

2. The substrate cleaning apparatus according to claim 1, further comprising:

a brush support arm that supports the brush;

a two-fluid nozzle support arm that supports the two-fluid nozzle; and

a controller configured to control movements of the brush support arm and the two-fluid nozzle support arm.

3. The substrate cleaning apparatus according to claim 2, wherein

the controller controls the movements of the respective support arms such that a moving speed of the two-fluid nozzle is higher than a moving speed of the brush.

4. The substrate cleaning apparatus according to claim 2 or 3, wherein

the controller controls the brush support arm and the two-fluid nozzle support arm to move in directions opposite to each other.

5. The substrate cleaning apparatus according to any one claims 2 to 4, wherein

the controller separates the brush from the substrate at a peripheral part thereof, and thereafter moves the two-fluid nozzle to a position above a portion with which the brush had been in contact immediately before the brush was separated therefrom.

6. The substrate cleaning apparatus according to claim 1, further comprising:

- a second two-fluid nozzle that sprays liquid droplets onto the substrate;

- a support arm that supports and moves the brush, the two-fluid nozzle, and the second two-fluid nozzle, such that the brush is positioned farther away from the center of the substrate than the two-fluid nozzle, and is positioned ahead of the second two-fluid nozzle in a rotational direction of the substrate; and

- a controller configured to control a movement of the support arm.

7. The substrate cleaning apparatus according to any one of claims 2 to 6, wherein

- the controller controls the movements of the respective support arms such that, while spraying liquid droplets from the two-liquid nozzle onto the substrate, the brush is brought into contact with the center of the substrate to start to move radially outward the substrate, and thereafter, the two-fluid nozzle is positioned above the center of the substrate to move radially outward the substrate.

8. The substrate cleaning apparatus according to any one claims 2 to 7, wherein

- the controller controls the movements of the respective support arms such that a moving speed of the brush relative to the substrate and a moving speed of the two-fluid nozzle relative to the substrate are reduced, as the brush and the nozzle move radially outward from the center of the substrate.

9. A substrate cleaning method for cleaning a substrate by bringing a brush into contact with a substrate while rotating the same, and by spraying liquid droplets from a two-fluid nozzle onto the substrate, wherein

the brush and the two-fluid nozzle are moved radially outward relative to a center of the substrate, while a cleaning position of the two-fluid nozzle is kept nearer to the center of the substrate than a cleaning position of the brush.

10. The substrate cleaning method according to claim 9, wherein

the brush is brought into contact with the center of the substrate, while spraying liquid droplets from the two-fluid nozzle onto the substrate, and the cleaning position of the brush is started to move radially outward the substrate, and thereafter the cleaning position of the two-fluid nozzle is positioned above the center of the substrate to move radially outward the substrate.

11. The substrate cleaning method according to claim 9 or 10, wherein

after the brush is separated from the substrate at a peripheral part thereof, the cleaning position of the two-fluid nozzle is moved to a position above a portion with which the brush had been in contact immediately before the brush was separated therefrom.

12. The substrate cleaning method according to any one of claims 9 to 11, wherein

the cleaning position of the brush and the cleaning position of the two-fluid nozzle are moved in directions opposite to each other.

13. The substrate cleaning method according to any one of claims 9 to 12, wherein

a moving speed of the cleaning position of the brush relative to the substrate and a moving speed of the cleaning position of the two-fluid nozzle relative to the substrate are reduced, as the cleaning position of the brush and the cleaning position of the nozzle move radially outward from the center of the substrate.

14. The substrate cleaning method according to any one of claims 9 to 13, wherein

a moving speed of the cleaning position of the two-fluid nozzle relative to the substrate is higher than a moving speed of the cleaning position of the brush relative to the substrate.

15. A medium for recording a program that allows a computer to execute the procedures of bringing a brush into contact with a substrate while rotating the same, and spraying liquid droplets from a two-fluid nozzle onto the substrate, wherein

the brush and the two-fluid nozzle are moved radially outward relative to a center of the substrate, while a cleaning position of the two-fluid nozzle is kept nearer to the center of the substrate than a cleaning position of the brush.

16. The medium according to claim 15, wherein

the program allows a computer to execute the procedure of bringing the brush into contact with the center of the substrate, while spraying liquid droplets from the two-fluid nozzle onto the substrate, and starting the cleaning position of the brush to move radially outward the substrate, and thereafter positioning the cleaning position of the two-fluid nozzle above the center of the substrate to move the same position radially outward the substrate.

17. The medium according to claim 15 or 16, wherein

the program allows a computer to execute the procedures of separating the brush from the substrate at a peripheral part

thereof, and thereafter moving the cleaning position of the two-fluid nozzle to a position above a portion with which the brush had been in contact immediately before the brush was separated therefrom.

18. The medium according to any one of claims 15 to 17, wherein

the program allows a computer to execute the procedure of moving the cleaning position of the brush and the cleaning position of the two-fluid nozzle in directions opposite to each other.

19. The medium according to any one of claims 15 to 18, wherein

the program allows a computer to execute the procedure of reducing a moving speed of the cleaning position of the brush relative to the substrate and a moving speed of the cleaning position of the two-fluid nozzle relative to the substrate, as the cleaning position of the brush and the cleaning position of the nozzle move radially outward from the center of the substrate.

20. The medium according to any one of claims 15 to 19, wherein

the program allows a computer to execute the procedure of controlling a moving speed of the cleaning position of the two-fluid nozzle relative to the substrate to be higher than a moving speed of the cleaning position of the brush relative to the substrate.